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School Leaders' Supports of Dual Language Science Teachers

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There were 5.1 million emergent bilingual/English learner (EL) students in U.S. public schools in 2019; this figure represented 10.4% of the total U.S. student population (NCES, 2022). During the 2021-22 school year, Texas reported that 21.7% of its 5,427,370 students were emergent bilingual/EL students (Texas Education Agency, 2022). The population of EL students is projected to continue to increase, as is the need for educational services. Many EL students are at a disadvantage when entering school due to a lack of English acquisition (Adams & Jones, 2006; Batt, 2008; Kim & García, 2014; Rhinehart et al., 2022). In addition, EL students can be disadvantaged because educators with preconceived attitudes about EL students and bilingualism can influence EL students' learning and efficacy (Baecher et al., 2013; DeMatthews & Izquierdo, 2017; Elfers et al., 2013).

EL students can excel in public schools if they are provided with the supports they need to acquire language and content. In a culturally and academically inclusive environment, the chance is greater for the achievement gap between EL and non-EL students to be closed (DeMatthews & Izquierdo, 2017). Teachers are an important part of the process and can impact the achievement gap for their EL students when they have access to the EL programs supports they need.

The state test data of the EL students of the teacher participants in the current study indicated that the achievement gap in science for the EL students was smaller than the state achievement gap. A primary purpose of this study was to examine what teachers perceived helped them to bridge the learning gap for their EL students in the subject of science. While researchers have examined English-language acquisition of EL students, little research has focused on EL students' science achievement (Austin et al., 2013).

Literature Review

Some school leaders are concerned about the length of time that it takes to complete EL programs (Cheung & Slavin, 2012; de Jong, 2004; Hakuta et al., 2000). Critics have posited that program length keeps some EL students from fully assimilating into the majority culture (de Jong, 2004; Planas & Civil, 2013). Others have stated that the time needed to complete bilingual programs does not allow EL students enough time to learn English (de Jong, 2004; Planas & Civil, 2013). Some fear that bilingual programs will inhibit EL students from learning English at the same pace as native English speakers and that bilingual students will need remediation to reach grade-level mastery (de Jong, 2004; Planas & Civil, 2013). However, other researchers who study dual language programs have found the programs to be more effective for English language learning because the programs utilize the EL student's first language to teach content and to assist with second-language acquisition (Estrada et al., 2009).

Language Acquisition

EL students perform better academically when they can use their first language to learn a second language. As a result, their classroom participation increases (Creese & Blackledge; 2010; Planas & Civil, 2013). Planas and Civil (2013) and Creese and Blackledge (2010) noted that students who were not able to use their first language in the classroom participated less than students who were allowed to do so. Students are more engaged in the classroom overall when permitted to use their first language in group settings (Creese & Blackledge; Planas & Civil). Furthermore, students participate in class discourse in English with less hesitation. In addition to the lack of educational opportunities caused by language barriers, EL students can face educational issues with high-stakes testing. Palmer and Snodgrass Rangel (2011) noted that the

development and use of EL students' first language is important to the development of the second language and, as such, a factor in high-stakes testing.

Administrative Supports

Teachers of EL students request assistance from their administrators in the areas of staffing, program supports, and creating an inclusive school environment. Staffing bilingual programs with qualified teachers helps to ensure program implementation and efficiency (DeMatthews & Izquierdo, 2016, 2017). School leaders who are cognizant of the needs of EL students can staff their programs more adequately, ensuring that teachers are aware of the linguistic and academic needs of the students they serve (Armendáriz & Armendáriz, 2002; Brooks et al., 2010; DeMatthews & Izquierdo, 2017; Elfers et al., 2013; Elfers & Stritikus, 2014; López & Iribarren, 2014; Rocque et al., 2016; Scanlan & Lopez, 2012; Theoharis & O'Toole, 2011).

School administrators have the power to train teachers and staff EL programs with teachers who have the pedagogical knowledge needed for teaching EL students (Armendáriz & Armendáriz, 2002; Baecher et al., 2013; Brooks et al., 2010; DeMatthews & Izquierdo, 2017; Elfers et al., 2013; Elfers & Stritikus, 2014; Rocque et al., 2016; Scanlan & Lopez, 2012; Theoharis & O'Toole, 2011). EL students' academic needs are more than learning subject-related content. Students also have linguistic needs that must be met to ensure that the content is mastered as thoroughly as possible. Teachers of EL students who are not prepared to integrate language into content teaching risk creating lost opportunities for EL students to show content mastery (Elfers et al., 2013). EL students benefit from linguistic supports that include the use of their first language when needed, word banks, and/or alternative assessments as a means of measuring student learning.

English Learner-focused Support

Administrators have a duty to ensure teachers of EL students are knowledgeable about the latest English language learning pedagogies and to support the implementation of those pedagogies in classrooms. Baecher et al. (2013) posited that administrators who support teachers of EL students with relevant and timely professional development and coaching also affect English language learning. Professional development and coaching supports ensure that teachers of EL students are adequately equipped with the latest curriculum and resources that EL students need to learn (Elfers & Stritikus, 2014). Administrators are the gatekeepers for English language learning and have a responsibility to ensure that curriculum and resources for EL students are pedagogically sound.

After ensuring that professional development, curriculum, and resources are adequate for their program, administrators must provide support to teachers to ensure the program is being implemented faithfully (Elfers et al., 2013). To ensure fidelity to program guidelines, school leaders can employ teacher coaches who are program experts to monitor and adjust the implementation of the program as needed. Support staff such as coaches and other administrators who work with EL students and their teachers should become familiar with the program requisites, pedagogy, and strategies aimed at helping EL students achieve success (Elfers et al., 2013).

Collaboration

Along with supports focused on English language learning, teachers need administrators who understand teachers' need to collaborate with each other and with school leaders when implementing academic programs and creating program goals (Baecher et al., 2013; Brooks et al., 2010; DeMatthews & Izquierdo, 2017; Elfers et al., 2013; Elfers & Stritikus, 2014). Time for

collaboration provides an opportunity for teachers to learn from each other and to create a sense of community within their program. Teachers of EL students can work together to vertically align the curriculum of their program as well as discuss program questions and student needs. Administrators who involve teachers of EL programs in the design and implementation of program policy help create teacher ownership of the program.

Another advantage of creating a collaborative environment for teachers is the creation of a school-wide climate in which the diversity of EL students is valued (Menken & Solorza, 2015). On these campuses, the environment is culturally and linguistically inclusive (Brooks et al., 2010; DeMatthews & Izquierdo, 2017; Elfers et al., 2013; Elfers & Stritikus, 2014; Rocque et al., 2016; Theoharis & O'Toole, 2011). Allowing EL students to use their first language in social spaces and in the classroom helps EL students feel part of their learning environment, confirming their contribution to the discourse in the classroom (Brooks et al., 2010; DeMatthews & Izquierdo, 2017; Menken & Solorza, 2015; Scanlan & López, 2012).

Cultural and Linguistic Awareness

There is a difference in pedagogies related to teaching content and teaching EL students, thus the need for culturally and linguistically relevant education. English learner-specific teaching pedagogy refers to supporting EL students' linguistic and cultural needs in addition to content knowledge. DeMatthews and Izquierdo (2016, 2017) theorized that administrators with a social justice approach to teaching EL students understand the importance of high-quality, engaging content for their students. These school leaders also help ensure that the school environment is culturally and linguistically welcoming for EL students. The administrators realize the need to include parental support in the mission and vision of their schools. Understanding EL students' cultural, linguistic, and academic needs while building relationships with EL families helps bridge the family-school connection that is integral to student success (DeMatthews & Izquierdo, 2016).

School leaders also need to understand the importance of empowering EL students' families to help direct their students' learning and learning programs (DeMatthews & Izquierdo, 2016; Niehaus & Adelson, 2014). Administrators who take the time to understand EL student's cultural and linguistic needs help to create an environment where EL students can fully participate in both their education and their community. School leaders who recognize the culture and language of EL students help to create a sense of self-worth in students, which leads students to become active participants in their education (Au, 2009; Esquinca, 2012; Hampton & Rodriguez, 2001).

Methodology

This qualitative study was conducted to examine how elementary, dual language, teachers of EL students perceived that administrative supports assisted their teaching and contributed to closing the science achievement gap for their EL students. A phenomenological approach was used to gain an understanding of the meaning of the experiences of the participants (Heidegger, 1985) and to examine teachers' perceptions of the supports that helped them bridge the science achievement gap for their students.

Bandura's social cognitive theory (1988) was used as the theoretical lens of the study. Bandura suggested that an individual's perceptions are affected by his or her environment, behavior, and other cognitive and personal factors when viewed through the lens of social cognitive theory. In this study, social cognitive theory was used to describe how the participants met the challenges related to teaching science to EL students. According to Bandura's (1988) three core beliefs, the use of social cognitive theory in organizations relies on developing

competencies through modeling, strengthening people's beliefs in their competence, and goal setting.

The interview questions were reviewed by a panel of educators with advanced degrees in education. After Institutional Research Board and school district approvals were obtained, prospective participants who met the study criteria were contacted. Study criteria for teacher participants included at least three years teaching science in the dual language program. For administrator participants, study criteria included direct supervision of a dual language program and direct supervision of dual language teachers.

The school district at which the prospective teacher participants were employed implemented the Gómez and Gómez dual language program model. The Gómez and Gómez model prescribes a Spanish-language teaching model for science, with students spending between 50-90 minutes learning science, according to grade level (Gómez, 2016). The model requires that science and social studies be taught in Spanish to ensure the continued development of academic language in the students' first language. In the dual language classrooms, students receive 50% of their instruction in English and 50% of their instruction in Spanish.

Data Collection

Semi-structured interview questions were used to gain an understanding of how the teacher participants perceived that the supports they received affected their teaching (Fontana & Prokos, 2007). The interview questions were open ended to help ensure that an accurate description of each participant's experiences was collected and to help capture a thorough description of the meaning the experience held for each participant (Dewey, 1996; Maxwell, 2013; Seidman, 2013). Each interview was recorded. The teacher participants responded to questions about their perceptions of the supports they received. An additional interview protocol was created for the administrator participants to inquire about supports the school leaders offered teachers of EL students that were designed to support English learners.

Individual teacher interviews were conducted until data saturation was reached (Creswell & Poth, 2018), resulting in interviews with eight dual language teachers of EL students. Two administrators were also interviewed to confirm information about the supports the teachers received. The administrators were current supervisors of the dual language teachers. They were responsible for the supervision of the dual language teachers and for supporting the dual language teachers through curriculum design, instructional pedagogy, and targeted professional development. The administrators worked with the teachers to implement the dual language program and aided in using appropriate instructional strategies for EL students. They also decided which curriculum the teachers would use, evaluated teachers' instructional methods to determine teacher efficacy, and selected the professional developments the teachers attended to enhance their content knowledge and teaching skills.

Data Analysis

The interviews were transcribed verbatim to help ensure that each interview thoroughly reflected the participants' voices and experiences regarding the supports they received (Creswell & Poth, 2018). Analytic memos were created during and after the interviews to help organize significant ideas that arose (Creswell & Poth, 2018).

First-cycle and second-cycle coding processes were used to code the data from the interviews and memos (Saldaña, 2013). In first-cycle coding, chunks of information were coded using a descriptive process wherein words or short phrases that summarized the topic were clustered to form chunks of data. Then the chunks were broken into smaller units of information to reflect the details of the initial, coded information (Saldaña, 2013). The second cycle of coding

was conducted to reduce the chunks of data into smaller units of information. Codes were generated based on the patterns and then grouped (Miles et al., 2014). Data from the second-cycle coding process were organized and grouped according to theme. A data matrix was created, and a separate column was included in which to note themes that emerged.

Findings

The teacher participants in this study were all women and all from one elementary school campus in Texas. Nine of the ten teacher participants identified as Latina/Hispanic, and one chose not to identify her ethnicity. Five of the participants were immigrants whose native language was Spanish. The teacher participants' ages ranged from 30-60, and their years of experience ranged from more than 5 years to approximately 25 years. Five of the participants had earned a master's degree or higher and all were certified to teach in an elementary setting. All teacher participants taught science in Spanish in the dual language program in first through fifth grades.

The teachers believed that the administrative supports were integral to their students' achievement in science. Three support-based themes emerged that were specifically perceived to affect student achievement: school leaders provided resources and communicated frequently about resource needs, school leaders prioritized opportunities for lesson modeling and demonstrations, and leaders planned for and facilitated collaborative planning and data meetings with the teachers.

The teacher participants were asked to explain their perceptions of supports that have helped their students learn science. Each participant described how their experiences shaped their views of the supports they received (Creswell & Poth, 2018).

Theme 1: Providing Resources and Communicating about Needs

Teacher participants shared that school leaders provided the resources they needed to teach science including supplemental materials, books, and classroom materials. The administrators checked in with the teachers to see if they needed additional resources. The administrators also provided EL students with language support through Spanish-language science curriculum and materials.

Carrie shared that her school leaders provided all the materials she needed for her science classroom. To Carrie, it could be a tall order to "[make] sure we...have the materials and that we have the money allotted for supplies...it is a lot of supplies." Teresa shared that her administrators provided bilingual resources for her EL students including Spanish-language, science-related materials. Emily stated that her school leaders supplied needed materials and resources when she asked. Helen also shared that she had everything she needed to teach science. The instructional coach frequently came to Helen's classroom to inquire about her needs and, if there were any, would help to provide resources. Helen shared, "I needed soil samples because there was no soil in the science lab, so she was able to get some from the nature center....if you need something...they're able to assist us."

Eliza said that she was provided with the opportunity to teach science freely in her classroom and stated that she felt that "administrators have tried to provide us with the tools...with the resources that we need to teach in a second language…for example…books...that we...had in English but not Spanish." Eliza was also provided with STEMscopes, a science learning program that had a Spanish-language translation for EL students.

Sometimes the resources provided were more than material items. Some school leaders provided time to discuss issues or tutoring and small-group instruction for students who were in need. The teachers stated that they could go to the members of the administrative team with

concerns or questions about their students and dual language program and the members of the team would make themselves available. Emily and Frida shared that they were able to access tutoring and small-group lessons for their students that were offered by the instructional coach. Natasha stated that her administrator provided funds for before and after school science tutoring for her EL students.

Five of the teacher participants said that they received all the materials and supplies they needed for required hands-on science activities. Everything those teachers needed was provided through their science lab or purchased with funds allocated for science. Three of the teacher participants noted that sometimes there were not enough supplies in the science lab due to each grade level teaching the same content at the same time; those teachers shared that although the materials were on campus, they had to request the supplies from the administrators. Administrators provided additional resources when requested.

Theme 2: Prioritizing Opportunities for Lesson Modeling and Demonstration

The teachers described lesson modeling as one of the supports the school leaders provided for them. The participants shared that modeling lessons was beneficial and provided them with another resource for teaching science, especially when they were unsure how to teach specific content.

Carrie said that she thought the model lessons were beneficial for teachers and felt that lesson modeling helped her to be more effective in teaching science. Helen agreed that modeling lessons was useful, even though the modeling may not be conducted in Spanish. She shared that lesson modeling was useful because the instructional coach had the teachers share lessons with each other and discuss how to incorporate the lesson ideas into their own classrooms. The instructional coach was instrumental in facilitating a collaborative environment in which the teachers modeled lessons for each other.

Some participants said that they were sometimes unsure of how to best teach science when they were new teachers; these participants shared comments indicating their gratefulness for having lessons demonstrated for them and said that they used the models as a basis for their teaching. Carrie stated, “modeling lessons helps, especially at the beginning when you don’t know what you’re doing, especially as a new teacher.” The teachers also shared that the facilitation of collegial modeling was beneficial.

Many of the teacher participants said they felt that their school leaders were supportive of their requests for lesson modeling and were willing to facilitate those requests though modeling lessons themselves or bringing in someone from outside of the school to model lessons when needed. One teacher participant noted that her instructional coach made weekly visits to her classroom to inquire about her needs, while another teacher said that her instructional coach would tutor a small group of struggling students. The constant communication between the administrators and teachers via alignment and planning allowed the teachers to focus on student learning.

Theme 3: Planning and Facilitating Collaborative Planning and Data Meetings

The teacher participants stated that their weekly planning/data meetings were beneficial to supporting their science instruction. The teachers described the administrators facilitating teacher collaboration, identifying areas of student weakness for reviewing or reteaching, relating Texas Essential Knowledge and Skills (TEKS) student expectations to be taught next, and sharing lessons related to student expectations. Student expectations are the knowledge and skills that students must demonstrate. The

school leaders were reported to have arrived at the meetings, prepared to discuss and share.

Frida said that her instructional coach had the testing information and TEKS that the team would be discussing ready for the data meeting. Teresa shared that her planning meetings included the TEKS to be taught along with possible resources needed for the associated lessons. Eliza said that her instructional coach facilitated well-prepared, structured data meetings, with clear expectations set for the teachers. She also shared that she felt supported by her instructional coach. Carrie stated that the instructional coach was prepared for data meetings and would have a plan for the next group of student expectations the students would be learning. "She knows exactly what we're teaching," Carrie added.

Teresa shared that school leaders' preparation of data and resources for the meetings was a great help to her. She said that the administrators were "very involved in helping us come up with ideas on how to reteach, even...discussing with us reasons...why students had misconceptions, try[ing] to create plans for us...to teach the next unit to ensure the students are successful." Teresa said that she felt that collaboratively planning for student misconceptions helped her to understand why students might misunderstand the concept and gave her a strategy to help resolve the misconceptions. What Teresa described as most important about the meetings was the collaborative planning time she and her colleagues shared as well as the trust of her leadership team.

The teacher participants appreciated the level of preparedness of the school leaders, and the administrator participants confirmed that they prepared for the meetings with their teachers. Amanda, a school leader, said that she prepared trainings for the teachers to ensure that they understood program requisites as well as state assessment requirements for students. She believed the best support she could give teachers was equipping them at the beginning of the school year. The preparation ensured that the teachers had the knowledge they needed to begin the year successfully.

Gloria, a school leader, stated that she helped teachers to incorporate science into math and reading when planning future lessons. She said that science was embedded in reading and math and that it was important for all teachers to be able to find ways to show students how science is part of both subjects. Gloria noted that science was not the major focus in third and fourth grades due to time spent preparing for state testing, so she had to examine the data after district testing to determine which student expectations were low and needed additional attention. In addition, she said that she planned how to incorporate science into math and reading and added enriching visual literacy into the science block. Gloria stated that using the data from testing and then creating strategies to reteach the areas in need of remediation was beneficial to student learning.

The planning/data meetings helped the teachers to identify areas of need and strategies to use to focus on those needs. The teacher participants shared that they appreciated the time and effort the administrators put into the planning and data meetings. They were grateful that the school leaders took the time to ensure that the teachers had all the information needed to be able to perform their instructional duties. The administrator participants understood that being prepared for meetings with resources including data and planning strategies was an integral part of the supports they could provide for their teachers.

Discussion and Implications

The teachers in the study perceived that supports from school leaders were integral to student achievement and important to the functioning of the EL program and to science classrooms. The supports appeared to reinforce the teachers' ability to meet the needs of their

students. Teachers perceived that the administrative supports strengthened their beliefs in themselves as instructors which positively affected their teaching abilities (Bandura, 1989).

Resources and materials for science were viewed by the teachers as essential to English language learning. The provision of resources provided to the teachers pertained to curricular resources, time, and additional tutoring. Administrators who provide their teachers with program support and teaching resource materials can positively affect student learning outcomes **(**Baecher et al., 2013). The teachers in the study reported that their administrators supplied supplementary curriculum resources such as trade books and technology such as iPad applications and computer programs designed for science. Elfers and Stritikus (2014) posited that teachers of EL students who are adequately prepared with the latest resources and curriculum positively affect English language learning.

Lesson modeling was the second administrative support identified by the teacher participants. Modeling lessons helps to prepare teachers for the classroom environment (Baecher et al., 2013; Brooks et al., 2010). Multiple participants stated that lesson modeling was especially important when they were new teachers. As veteran teachers, they said that they now seek model lessons to refresh their teaching and provide new ideas for their classrooms. The teachers described modeling as an instructional support they felt was essential to their students' success. According to Bandura's (1988) social cognitive theory, competency can be developed through modeling, which corresponds to the teachers' perceptions of its importance.

The administrators conducted planning and data meetings that were specific to their EL students' needs. The meetings involved identifying the student expectations for the week's learning, reviewing areas of weakness and/or need, and encouraging teacher collaboration. The administrators relayed student testing data and provided teachers with information regarding content to be taught and remediated.

Almost all the teacher participants shared that attending these meetings was beneficial in their preparation to teach future content. One teacher stated that planning meetings were beneficial because her team collaborated to design lessons and shared teaching knowledge. This collaboration was like that discussed by Baecher et al. (2013) who recommended that administrator candidates and teacher candidates work together within an EL program setting to collaborate to create improved EL programs for their schools.

Each of these supports was perceived, overall, as positively affecting students through supporting teacher knowledge and performance. While the school leaders' support of teachers is notable, particularly when many schools and districts are experiencing funding challenges, teachers noting the allocation of tools to do their jobs as a support was compelling. We do not often hear about insurance agencies that require employees to bring their own office supplies or hospitals that mandate that physicians purchase surgical gloves. But teachers paying for their own classroom supplies has become such an expectation that educators are offered a federal tax deduction for eligible expenses. It was thus not surprising that the teachers listed supplies, in part, as a support rather than as an expectation.

The administrators' endeavors to meet the resource needs of teachers should not be disregarded. The school leaders were described as supportive and as ensuring that students had tutors and extra assistance. However, those preparing future school leaders can help reinforce the stance that providing teachers with the tools they need is a necessity rather than a luxury.

Preparation and certification programs could also provide future administrators with opportunities to review and evaluate other learning-centered supports for teachers. Aspiring administrators could review available materials, working groups, and professional organizations

that might enhance instructional skills for teachers and improve learning opportunities for EL students.

Recommendations for Further Research

The data from this study showed that the collaboration between teachers and school leaders was viewed as positive for both groups. Future considerations for research could include exploring, on a larger scale, how teacher and administrator collaboration might affect student learning outcomes and how educators perceive collaboration and shared inputs for program design impact the instruction and achievement of EL students.

Additional research could be conducted to determine if modeling lessons for teachers affects student achievement on state and national assessments. In addition, future research could examine the experiences of additional dual language teachers and administrators and explore whether teachers and administrators identify the same supports as the participants in this study. Other studies could include a comparison of the supports participants perceive are beneficial to close the achievement gap for EL students in high school science.

Conclusion

The teacher participants in this study were asked about their perception of the supports they were provided to teach EL students. Bandura (1989) stated that a person who has a strong belief in his or her competency will see challenges as opportunities to master, rather than obstacles. Modeling and goal setting help develop that sense of competency. Modeling is the first step toward gaining competency in one's abilities (Bandura, 1989). The individual needs frequent practice and experiences to develop proficiency. The individual then begins the process of goal setting to motivate himself or herself to continue to perform the tasks he or she learned and to monitor his or her performance. According to the respondents, the administrative supports provided allowed for opportunities for planning, modeling, communication, and collaboration toward a shared goal of increased student performance. The uniting of teachers and administrators to make decisions may lead to more effective teaching and higher student achievement for EL and non-EL students.

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